

In the claims:

1. A system for sub-ambient pressure control for column head pressure in a gas chromatography (GC) system, comprising:

an inlet including:

5 a valve that regulates an inlet pressure;
 a pressure sensor that measures the inlet pressure and outputs a signal that indicates a measured inlet pressure, wherein the inlet includes an inlet-pressure set-point that can be set to a negative pressure set-point representing a pressure below ambient pressure, the negative pressure set-point driving the valve to change the inlet pressure
10 until the measured inlet pressure equals the negative pressure set-point; and
 a capillary column connected to the inlet.

2. The system of claim 1, further comprising:

a mass spectrometer (MS) connected to the capillary column.

3. The system of claim 1, wherein the inlet further includes:

15 an electronic pressure controller that drives the valve in response to the inlet-pressure set-point and the measured inlet pressure.

4. The system of claim 1, wherein the pressure sensor is a gauge pressure sensor.

5. The system of claim 1, wherein the GC includes instructions on a computer-readable medium for:

20 setting the inlet-pressure set-point to a negative pressure set-point; and
 driving the valve to change the inlet pressure until the measured inlet pressure equals the negative pressure set-point.

6. The system of claim 1, wherein the inlet includes an error amplifier that receives the measured inlet pressure signal and an inlet-pressure set-point signal and outputs a
25 decreasing drive to the valve when the inlet-pressure set-point signal is less than the measured inlet pressure signal.

7. The system of claim 6, wherein the error amplifier outputs an increasing drive to the valve that causes the valve to increase the inlet pressure.

8. The system of claim 2, wherein the MS includes a vacuum pump connected to the
30 capillary column.

9. The system of claim 1, wherein the inlet further includes:

a septum purge; and
a cap on the septum purge.

10. The system of claim 1, further comprising:
a computer, connected to the GC, including:

5 a processor; and
a memory that includes instructions executed by the processor for:
setting the inlet-pressure set-point to a negative pressure set-point;

and

causing the valve to change the inlet pressure until the measured
10 inlet pressure equals the negative pressure set-point.

11. The system of claim 1, wherein the gauge pressure sensor includes an offset (v_o)
so that a measured inlet pressure of zero (0psig) causes the gauge pressure sensor to
output a positive measured inlet pressure voltage (v_o , where $v_o > 0$ volts).

12. The system of claim 1, wherein the offset is 1 volt ($v_o = 1$ volt).

15 13. The system of claim 1, wherein the offset is large enough to avoid the gauge
pressure sensor inadvertently outputting a negative measured inlet pressure voltage.

14. A method for sub-ambient pressure control for column head pressure in a gas
chromatography (GC) system comprising:

receiving a desired negative pressure set-point representing a pressure below
20 ambient pressure; and

setting an inlet pressure set-point to the desired negative pressure set-point,
wherein the desired negative pressure set-point indicates a desired negative inlet pressure
for an inlet of the GC.

15. The method of claim 14, further comprising:

25 reading a measured inlet pressure, wherein the measured inlet pressure is
measured by a gauge pressure sensor in an inlet of the GC;

comparing the measured inlet pressure to the inlet pressure set-point;

determining if the measured inlet pressure is greater than the inlet pressure set-
point; and

30 if the measured inlet pressure is greater than the inlet pressure set-point,
decreasing the inlet pressure until the inlet pressure is a negative pressure matching the
inlet pressure set-point.

16. The method of claim 14, further comprising:
if the measured inlet pressure is less than the inlet pressure set-point, increasing the inlet pressure until the inlet pressure is a negative pressure matching the inlet pressure set-point.
- 5 17. The method of claim 15, wherein the decreasing step includes causing a proportional valve in the inlet of the GC to decrease the inlet pressure.
18. The method of claim 14, further comprising:
setting a gauge pressure sensor offset (v_o) so that a measured inlet pressure of zero (0psig) causes a gauge pressure sensor to output a positive measured inlet pressure
10 voltage (v_o , where $v_o > 0$ volts).
19. A computer-readable medium comprising instructions for sub-ambient pressure control for column head pressure in a gas chromatography (GC) system by:
receiving a desired negative pressure set-point representing a pressure below ambient pressure; and
15 setting an inlet pressure set-point to the desired negative pressure set-point, wherein the desired negative pressure set-point indicates a desired negative inlet pressure for an inlet of the GC.
20. The computer-readable medium of claim 19, further comprising instructions for:
reading a measured inlet pressure, wherein the measured inlet pressure is
20 measured by a gauge pressure sensor in an inlet of the GC;
comparing the measured inlet pressure to the inlet pressure set-point;
determining if the measured inlet pressure is greater than the inlet pressure set-point; and
if the measured inlet pressure is greater than the inlet pressure set-point,
25 decreasing the inlet pressure until the inlet pressure is a negative pressure matching the inlet pressure set-point.